REMARKS

No new matter has been added. The amendments to the claims address typographical and spelling errors, and improve antecedent basis. The amendments do not affect, or surrender, any scope of any claim as originally filed.

The Applicants again request entry of the amendments as set forth herein prior to examination of the application on the merits.

Respectfully submitted,

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IN THE SPECIFICATION:

Please replace paragraph number **[0001]** with the following rewritten paragraph:

[0001] This application is a continuation of application Serial No. 10/155,654, filed May 23, 2002, ~~pending,~~ now U.S. Patent 6,584,897, issued July 1, 2003, which is a continuation of application Serial No. 09/894,935, filed June 28, 2001, now U.S. Patent 6,427,587, issued August 6, 2002, which is a continuation of application Serial No. 09/572,738, filed May 17, 2000, now U.S. Patent 6,269,742 B1, issued August 7, 2001, which is a continuation of application Serial No. 09/030,047, filed February 24, 1998, now U.S. Patent 6,089,151, issued July 18, 2000.

Please replace paragraph number **[0010]** with the following rewritten paragraph:

[0010] U.S. Patent 5,460,316, issued October 24, 1995, also discloses the use of stencils and apertures with tapered walls. The apertures having tapered walls provide a larger cross-sectional base area of the aperture adjacent the substrate than at the cross-sectional area at the opening or top of the aperture into which the solder paste is applied to the stencil. In both references, the larger cross-sectional base area of the aperture in the stencil is provided to reduce the amount of solder paste pulled away when the stencil is removed; however, the stencils require a larger cross-sectional base area for increased height or thickness of the solder ~~pasted~~ paste being applied through the aperture to the substrate.

Please replace paragraph number **[0023]** with the following rewritten paragraph:

[0023] FIG. ~~11~~ 11 is a block diagram of a computer system incorporating the PCB of FIG. 10.

Please replace paragraph number **[0026]** with the following rewritten paragraph:

[0026] In FIG. 2, once the stencil 12 is placed upon substrate 14 of a semiconductor device, a material 26 is applied across the top surface of stencil 12 via a wiper 24. The

material 26 extrudes through the first portion of aperture 16 being constrained by first wall 18 and further extrudes through the second portion of the aperture 16, not contacting the second wall 20 thereof. As illustrated, material 26 contacts surface 22 of substrate 14, having an area substantially the same shape as formed by first wall 18. The extruded material 26 only contacts the first wall 18 of the aperture 16 of the stencil in a small area adjacent the top or upper end of the first portion formed by first wall 18 of aperture 16. Illustrated in FIG. 3 is the extruded material remaining on the substrate 14 as ~~an~~material element 28~~ of material~~.

Please replace paragraph number **[0028]** with the following rewritten paragraph:

[0028] The cross-sectional area of the second portion formed by second wall 20 of aperture 16 ranges from 1.1 to 10 times the cross-sectional area of the first portion formed by the first wall 18 of the aperture 16. The ratio of cross-sectional area of the second portion formed by second wall 20 to the cross-sectional area of the first portion formed by first wall 18 of the aperture 16 should not be so large as to allow deflection of the stencil 12 in the area of the aperture 16 when the wiper 24 presses downwardly across the surface of stencil 12. Further, the use of the second portion formed by second wall 20 having a substantially larger cross-sectional area than the cross-sectional area of the first portion formed by first wall 18 allows the extruded material forming material element 28 to have a vertical height substantially equal to twice the nominal diameter of the material element 28 at the base thereof, or greater, depending upon the viscosity of the material 26 and the slump of such material 26 after the removal of the stencil 12.

Please replace paragraph number **[0032]** with the following rewritten paragraph:

[0032] Yet another embodiment of stencil 12 is illustrated in FIGS. 7 and 8. FIG. 7 illustrates a stencil 12 being formed in multiple layers ~~34,36,~~34, 36 thereby having formed therein first and second walls 18 and 20, respectively, of an aperture 16. The first layer 34 forms the first portion of each aperture 16 by way of first wall 18 therein. Next, a second layer 36, applied to the bottom of first layer 34, forms the second portion of aperture 16 by way of second wall 20 therein. Second layer 36 forms second portions of aperture 16 having larger

cross-sectional areas than the cross-sectional areas of the first portions by way of the nominal diameter of the cross-sectional areas formed by second walls 20 being greater than the nominal diameter of the cross-sectional areas formed by first walls 18. If desired, more than two layers ~~34,36~~34, 36 may be used. FIG. 8 illustrates material element 28, formed in a similar manner as is depicted in FIGS. 1-4, using the stencil formed of multiple layers 34, 36.

Please replace paragraph number **[0035]** with the following rewritten paragraph:

[0035] The use of an aperture 16, having a larger cross-sectional area in contact with the surface of the substrate where material 26 is extruded onto the substrate 14, offers several benefits. One benefit is that greater package reliability is achieved. This is because stresses in the extruded material forming material elements 28 are reduced due to the overall height allowing for stresses to spread out, compensating for mismatched coefficient of thermal expansion (CTE) between the substrate 14 and the die that will be attached to substrate 14. Typically, the CTE of the die is less than the CTE of the substrate. Another benefit is that of higher yield. Greater yield is achieved because the material elements 28 more consistently conform to the desired critical dimensions and are protected or untouched in portions of the apertures 16 of the stencil 12. Another benefit is that the stencil 12 can be cleaned more easily, as there is less material left in a portion of the aperture 16. Yet another benefit is that of higher throughput. This is achieved since the stencil 12 has less material 26 remaining therein for cleaning or for redeposition. Additionally, material seepage is greatly reduced, if not entirely eliminated, because the material is extruded without excessive pressure being applied to the stencil to cause the deflection thereof, thereby minimizing the occurrences of bridges or shorts formed from excess material applied to the substrate 14. This not only increases throughput, but also yield. Additionally, since the stencil 12 has less material remaining on it, it can either be cleaned more frequently with less wear or cleaned less often, thus saving a step. Further, less pressure is needed to hold the stencil 12 in place on the substrate 14 since the bottom perimeter of each aperture 16 is more effective in controlling seepage. With this reduced pressure, less wear is placed on the stencil that results in a greater life expectancy.

IN THE CLAIMS:

Claims 1 and 2 have been amended herein. All of the pending claims 1 through 11 are presented below. This listing of claims will replace all prior versions and listings in the application. Please enter these claims as amended.

1. (Currently Amended) A ~~paste forming~~ method for forming paste on a surface of an object comprising:

providing a stencil having a plurality of apertures formed therethrough from a top surface of said stencil to a bottom surface of said stencil, at least one aperture of said plurality of apertures including a first portion having a first cross-sectional area formed by a first wall portion having a first diameter and extending generally vertically from said top surface of said stencil, a second portion of said at least one aperture of said plurality of apertures adjacent said bottom surface of said stencil and having a second cross-sectional area formed by a second wall portion having a second diameter larger than said first diameter of said first wall portion and extending generally vertically from said bottom surface of said stencil, said stencil having a thickness in the range of from 0.1 to 10 times said first diameter of said first wall portion of said at least one aperture of said plurality of apertures, and at least one sloped annular shoulder having a shape located between said first wall portion and said second wall portion of said at least one aperture of said plurality of apertures;

applying said stencil to ~~a~~ said surface of said object;

applying paste to said stencil;

wiping said paste across said top surface of said stencil to force said paste through said plurality of apertures;

preventing contact of said paste with a portion of said second wall portion of said at least one aperture of said plurality of apertures during said ~~extruding of~~ applying said paste by said second cross-sectional area of said second portion of said at least one aperture of said

plurality of apertures being larger than said first cross-sectional area of said first portion of said at least one aperture of said plurality of apertures; and

removing said stencil and leaving portions of said paste in a substantially vertical column.

2. (Currently Amended) The method according to claim 1, wherein said ~~extruding~~ applying further comprises:

applying said paste to said top surface.

3. (Original) The method according to claim 1, wherein said paste has a viscosity of approximately 70K centipoise.

4. (Original) The method according to claim 1, wherein said paste has a thixotropic index ranging between about 1.7 to 3.2.

5. (Original) The method according to claim 1, wherein said paste has a thixotropic index of approximately 2.5.

6. (Original) The method according to claim 1, wherein said stencil is made of stainless steel.

7. (Original) The method according to claim 1, wherein said stencil is made of plastic.

8. (Original) The method according to claim 1, wherein said at least one sloped annular shoulder slopes from said first portion of said at least one aperture of said plurality of apertures towards said second portion of said at least one aperture of said plurality of apertures.

9. (Original) The method according to claim 8, wherein said at least one sloped annular shoulder has an acute shape.

10. (Original) The method according to claim 8, wherein said at least one sloped annular shoulder has an obtuse shape.

11. (Original) The method according to claim 8, wherein said at least one sloped annular shoulder has an indented shape.